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**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

Docket Number (Optional)

050103-0528

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on \_\_\_\_\_

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Name \_\_\_\_\_

Application Number

10/776,222

Filed

February 12, 2004

First Named Inventor

Erol GIRT, et al.

Art Unit

1773

Examiner

Kevin M. Bernatz

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐

applicant/inventor.

☐assignee of record of the entire interest.  
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.  
(Form PTO/SB/96)☒attorney or agent of record.  
Registration number

46,429

☐attorney or agent acting under 37 CFR 1.34.  
Registration number if acting under 37 CFR 1.34

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April 9, 2007

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☒\*Total of 1 forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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## REMARKS

Claims 1, 13, 14, 17, 18, and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lambeth et al. (WO 99/24973) in view of Nakamura et al. (U.S. Pat. Pub. No. 2004/0027868).

This rejection is in clear error, as obviousness under 35 U.S.C. §103 requires an objective teaching in the references or in the art that would have motivated one skilled in the art to modify or combine the references to yield the claimed invention. No such motivation was shown in the Office Action, because none exists.

Claim 1 requires a perpendicular magnetic recording medium comprising a non-magnetic interlayer structure. In response to an election of species requirement imposed by the Examiner (March 14, 2006) Applicants elected the species wherein the non-magnetic interlayer structure comprises a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material.

The Examiner contends that Lambeth et al. disclose a perpendicular magnetic recording medium comprising a non-magnetic interlayer structure having layers of (111) Ag and (0002) Ti in contact. The Examiner asserted that Lambeth et al. teach that both Au and Ag are suitable *fcc* materials (June 23, 2006 Office Action, page 5). The Examiner acknowledged that Lambeth et al. fail to disclose the layer of different material comprising Ru, instead teaching a layer of *hcp* titanium. The Examiner deemed that *hcp* titanium layers and *hcp* Ru layers of Ru alloys are known equivalents in *hcp* non-magnetic interlayers for use in controlling the crystallographic growth, orientation and properties of perpendicular recording media as taught by Nakamura et al. (December 8, 2006 Office Action, page 2).

The Examiner, however, has not established that *hcp* titanium and *hcp* Ru or Ru alloy layers are known equivalents in perpendicular magnetic recording medium having a non-magnetic interlayer structure, wherein the interlayer structure comprises a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material, as required by claim 1.

In the Advisory Action dated March 26, 2007, the Examiner explained that Nakamura et al. disclose a non-magnetic underlayer comprising a *fcc* seed layer 103 and a *hcp* layer composed of Ru overlying the *fcc* seed layer. The Examiner referred to Table 1 of Nakamura et al. as teaching the equivalency of Ti and Ru.

Table 1, however does not disclose Ti, but rather an alloy of Ti and 10 at % Cr. Therefore, contrary to the Examiner's assertion, there is no teaching in Lambeth et al. or Nakamura et al. that Ti and Ru are equivalents. Furthermore, the data in Table 1 of Nakamura et al. clearly demonstrate that Ru and Ti/10% Cr alloy are not equivalents. The use of Ti/10 % Cr alloy gives a coercive force H<sub>c</sub> of 2,060 Oe, squareness ratio S of 0.78, signal to noise ratio SNR of 13.9 dB, and a half width  $\Delta\theta_{50}$  of 10.6, whereas the use of Ru provides H<sub>c</sub> of 4,800, S of 0.95, SNR of 15.7, and  $\Delta\theta_{50}$  of 5.2.

One of skill in this art would not consider Ru and Ti to be equivalents for use in a nonmagnetic layer. Further, there are large difference in lattice constants and surface energies. The lattice constants for Ru are a = 2.7059 and c = 4.2818, and for Ti are a = 2.9512 and c = 4.2818. The surface energy of Ru is  $2.792 \times 10^{-3}$  N/m, while the surface energy of Ti is  $1.953 \times 10^{-3}$  N/m. In addition, Ti layers are more likely to oxidized during subsequent magnetic media processing in environments containing oxygen than a Ru layer. The Examiner has clearly not established that Ti and Ru nonmagnetic underlayers are equivalent in the claimed magnetic media.

Claims 1-5 and 11-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Abarra et al. (U.S. Pat. Pub. No. 2003/0186086) in view of the knowledge in the art as exemplified by Chen et al. (U.S. Pat. Pub. No. 2004/0191578) and/or Lal et al. (U.S. Pat. No. 5,922,442) and/or Malhotra et al. (IEEE Trans. Mag., 36(5), 9/2000, 2309-2311).

Claims 1-5 and 11-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Abarra et al. in view of Yamamoto et al. (U.S. Pat. Pub. No. 2004/0043258) in view of the knowledge in the art as exemplified by Chen et al. and/or and or Lal et al. and/or Malhotra et al.

These rejections based on Abarra et al. are in clear error, as obviousness under 35 U.S.C. §103 requires an objective teaching in the references or in the art that would have motivated one skilled in the art to modify or combine the references to yield the claimed invention. No such motivation was shown in the Office Action, because none exists.

The Examiner acknowledged that Abarra et al. fail to disclose a layer of different material comprising Ru, and instead teach that element 54 comprises a bcc Cr-M alloy, such as CrMo, CrTi, CrV, or CrW. The Examiner deemed that bcc CrRu layers and bcc Cr-M alloy layers are known equivalents in the bcc non-magnetic interlayers for use in controlling the crystallographic growth, orientation and properties of perpendicular recording media as allegedly taught by Chen et al. '578, Lal et al., and Malhotra et al. (December 8, 2006 Office Action, pages 3 and 4). In addition, the Examiner acknowledged that Abarra et al. fail to explicitly disclose selecting Au or Au-X from the list of fcc materials. The Examiner, however, averred that Yamamoto et al. illustrate a Cu-X alloy and teach that

Au is a suitable equivalent to Cu as a fcc based material (paragraph 0019) (June 23, 2006 Office Action, page 9). The Examiner alleged that substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency (December 8, 2006 Office Action, pages 4 and 5).

The Examiner, however, has not established a prima facie case of obviousness because the Examiner has not established that bcc CrRu layers and bcc Cr-M alloy layers are known equivalents in perpendicular magnetic recording medium having a non-magnetic interlayer structure, wherein the interlayer structure comprises a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material, as recited in claim 1.

In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). The Examiner has not established that the Cr-M alloy of Abarra et al. and the CrRu alloy layers of Chen et al., Lal et al., and Malhotra et al. are known equivalents when used in the claimed structure. Further, because different elements and alloys have different lattice parameters and crystallographic structures and the effect the underlayer has on the overall magnetic recording medium is also dependent on the lattice parameters and crystallographic structure of underlying and overlying layers, it is clear that one of skill in this art would not have recognized the Cr-M alloy layer of Abarra et al. and the CrRu alloy layers of Chen et al., Lal et al., and Malhotra et al. are known equivalents in the claimed magnetic recording medium.

The Examiner has not provided any motivation in Abarra et al., Yamamoto et al., Chen et al., Lal et al., and Malhotra et al. to substitute an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Abarra et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

Claims 1-5, 11-13, 17, and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Nakamura et al.

Claims 14-16, 18, and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Nakamura et al. and further in view of Abarra et al.

These rejections based on Yamamoto et al. and Nakamura et al. are in clear error, as obviousness under 35 U.S.C. §103 requires an objective teaching in the references or in the art that

would have motivated one skilled in the art to modify or combine the references to yield the claimed invention. No such motivation was shown in the Office Action, because none exists.

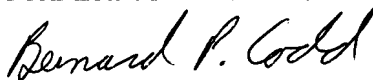
The Examiner acknowledged that Yamamoto et al. fail to disclose the layer of different material comprising Ru, instead teaching a layer of hcp CoCr. The Examiner alleged that Nakamura et al. teach that instead of using a layer of hcp CoCr one should use a layer hcp Ru in order to improve the lattice matching between seed layer and the magnetic layer and hence improve the perpendicular magnetic properties.

Yamamoto et al. and Nakamura et al., whether taken alone or in combination, do not suggest the claimed perpendicular magnetic recording medium. Yamamoto et al. and Nakamura et al. do not suggest an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a  $\langle 111 \rangle$  preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Abarra et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

Contrary to the Examiner's allegations, there is no suggestion in Nakamura et al. to use a layer of hcp Ru **instead** of hcp CoCr to improve the lattice matching between seed layer and the magnetic layer and hence improve the perpendicular magnetic properties. There is no motivation in Yamamoto et al. and Nakamura et al. to substitute an interlayer structure comprising a layer of a *fcc* Au-containing non-magnetic material having a  $\langle 111 \rangle$  preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Abarra et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

Withdrawal of the rejections and allowance of the application are believed to be appropriate and respectfully solicited.

Respectfully submitted,  
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